



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/822,586

03/30/2001

Harold S. Stone

14406 (NECI 1100)

1271

7590

09/23/2004

Benjamin Lee
NEC Laboratories America, Inc
4 Independence Way
Princeton, NJ 08540

EXAMINER

TUCKER, WESLEY J

ART UNIT

PAPER NUMBER

2623

DATE MAILED: 09/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/822,586

Applicant(s)

STONE ET AL.

Examiner

Wes Tucker

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment and Arguments

1. Applicant's response to the last office action, filed January 30, 2004 has been entered and made of record.
2. Applicant has amended claims 26, 27, and 28 to overcome the 112 rejections given. No other claims have been amended. Claims 1-28 are pending.
3. Applicant's arguments, see Amendment A, filed 6-1-2004, with respect to the rejection(s) of claim(s) 1-28 under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the combination of U.S. Patent 5,982,915 to Doi et al. and U.S. Patent 6,075,905 to Herman et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 12-18, and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 5,982,915 to Doi et al. and U.S. Patent 6,075,905 to Herman et al.

With regard to claim 1, Doi discloses a method for registration of first and second images out of registration, the method comprising the steps of:

- (c) reducing the resolution of the first and second images (abstract and column 5, lines 46-54); and

- (d) registering the first and second images of reduced resolution from the previous step (column 5, lines 43-46). Doi discloses a method of matching medical images that reduces the resolution of the images before matching them or determining alignment.

Doi does not disclose the preliminary steps of:

- (a) making the edges in the first and second images more prominent; and
- (b) thresholding the first and second images from the previous step using a threshold for which N percent of the pixels of each of the first and second images are over the threshold.

Herman teaches these steps (column 21, lines 40-44). Herman discloses extracting edge information or making the edges more prominent with a filter and then thresholding the image on a pixel-by-pixel basis. Herman teaches that this technique is helpful in making edges stand out more so that when the image is low-pass filtered or blurred, edge information is still retained and useable at low resolution levels (column

21, lines 30-55). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use the preliminary operation of edge information extraction taught by Herman before performing the blurring and registration of the images as disclosed in the invention of Doi in order that edge information would be retained and not obscured in the blurring process enabling easier more accurate image registration.

With regard to claim 2, Doi discloses blurring the first and second images from the thresholding step (column 5, lines 55-65). It is understood that from the combination of Doi and Herman that the blurring step would come after the thresholding step.

With regard to claim 3, Doi discloses the method of claim 2, wherein the blurring step comprises filtering each of the first and second images from the thresholding step such that each pixel therein is thickened by a predetermined number of pixels in a square array that extends the predetermined number of pixels in all four directions from a current pixel (column 5, lines 55-66). Doi discloses square 5x5, 9x9, and 13x13 filter kernels.

With regard to claim 4, Doi and Herman disclose the method of claim 1. The combination of Doi and Herman does not disclose the step of increasing the resolution of the registered first and second images from the registering step. Herman does disclose using pyramids consisting of low to high resolutions, and it would be desirable to increase the resolution to restore the resolution after it has been reduced and the

images have been registered in order to restore the image content. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to increase the resolution once the images have been registered in order to restore image content lost in the image resolution reduction process.

With regard to claim 5, Herman discloses wherein step (a) comprises filtering the first and second images with an edge-enhancement filter (column 21, lines 40-43).

With regard to claim 6, Doi and Herman disclose the method of claim 1, wherein N is the percentage of pixels over the threshold. Herman and Doi do not disclose N as being the particular range of 70-80 percent. However any range of thresholding can be determined through the practice of routine experimentation to determine the optimal range of useful pixels. Therefore it would have been obvious to one of ordinary skill in the art to use a threshold to select any percentage range in order to achieve desirable results after performing routine experimentation.

With regard to claim 7, the discussion of claim 6 applies. Any percentage can be determined through routine experimentation.

With regard to claim 12, Herman discloses a program storage device readable by machine, tangibly embodying a program of instructions executable by machine to perform method steps for registration of first and second images out of registration

Art Unit: 2623

(column 21, lines 40-55). Herman discloses an apparatus for performing registration of images using the steps claimed in claim 1. Herman discloses that his method may be performed automatically by the system or guided by a user interface (abstract). A program storage device readable by machine is inherent in the embodiment disclosed by Herman.

With regard to claims 13 and 14, the discussion of claims 2 and 3 applies.

With regard to claim 15, the discussion of claim 4 applies.

With regard to claim 16, the discussion of claim 5 applies.

With regard to claims 17 and 18, the discussion of claims 6 and 7 applies.

With regard to claim 23, the discussions of claims 1 and 12 apply. A computer program product and computer readable code are inherent in the apparatus disclosed by Herman.

With regard to claim 24, the discussion of claims 2 and 3 applies.

With regard to claim 25, the discussion of claims 4 and 15 applies.

Claims 8, 19, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 5,982,915 to Doi and U.S. Patent 6,075,905 to Herman et al. in view of U.S. Patent 6,591,196 to Yakhini et al.

With regard to claim 8, Doi and Herman disclose the method of claim 1, but do not disclose wherein step (b) further comprises choosing N automatically by computing a histogram of pixel intensities and setting the threshold for which N percent are over the threshold for a predetermined value of N. Yakhini discloses computing a histogram (Fig. 17) of pixel intensity values and determining a pixel threshold value from the histogram and the threshold is predetermined to be a certain percentile (column 10, lines 65-70 and column 11, lines 1-5). Yakhini teaches that the threshold may be optimized according to the features and characteristics of the image (column 11, lines 5-8). Therefore it would be obvious to one of ordinary skill in the art at the time of invention to use the histogram calculation method as taught by Yakhini to choose the percentile threshold in the method of Doi and Herman in order to optimize the chosen threshold according to the characteristics determined by the histogram.

With regard to claim 19, the discussion of claim 8 applies.

With regard to claim 26, the discussion of claims 8 and 19 applies.

Claims 9, 20, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 5,982,915 to Doi et al. and U.S. Patent 6,075,905 to Herman et al. in view of U.S. Patent 4,972,359 to Silver et al.

With regard to claim 9, Doi and Herman discloses the method of claim 1, but does not disclose wherein step (c) comprises reducing the resolution of each of the first and second images from the previous step by a factor used to partition each of the first and second images from the previous step into square blocks of pixels and replacing each square with the sum of the pixel values. Silver discloses a method of spatial averaging in which the resolution of an image is reduced by averaging blocks of pixels. Silver teaches that spatial averaging is used to reduce processing time (column 1, lines 35-40). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to reduce the resolution by partitioning the image into blocks as taught by Silver in order to reduce processing time in the method of Doi and Herman.

With regard to claim 20, the discussion of claim 9 applies.

With regard to claim 27, the discussion of claims 9 and 20 applies.

Claims 10, 11, 21, 22, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 5,982,915 to Doi et al. and U.S. Patent 6,075,905 to Herman et al. in view of U.S. Patent 5,295,200 to Boyer et al.

With regard to claims 10 and 11, Doi and Herman disclose the method of claim 1, but do not disclose using normalized correlation or Fourier technique. Boyer discloses determining the alignment of two images using normalized Fourier correlation integrals (column 6, lines 10-25). Boyer teaches that Fourier correlation is useful for obtaining a rapid numerical measure of the similarity between the two images to be registered. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use normalized correlation and Fourier technique in order to increase the processing speed by obtaining rapid calculations of similarity between images to be registered.

With regard to claims 21 and 22, the discussion of claims 10 and 11 applies.

With regard to claim 28, the discussion of claims 10 and 21 applies.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wes Tucker whose telephone number is 703-305-6700. The examiner can normally be reached on 9AM-5PM.

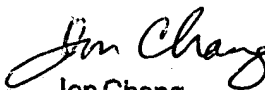
Art Unit: 2623

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wes Tucker

9-17-2004


Jon Chang
Primary Examiner